**Reaction Mechanisms Practice Problems**

Answer the following questions on Reaction mechanisms:

1. Consider the following rate mechanism:

Step 1: HBr + O2 🡪 HOOBr (slow)

Step 2: HOOBr + HBr 🡪 2HOBr (fast)

Step 3: HOBr + HBr 🡪 H2O + Br2 (fast)

Step 4: HOBr + HBr 🡪 H2O + Br2 (fast)

1. what is the overall equation?

4HBr (g) + O2 (g) 🡪 2H2O (g) + 2Br2 (g)

1. what is the rate law for this equation?

rate = k[HBr]1[O2]1

1. Draw an energy potential diagram for this possible reaction mechanism
2. Propose a possible reaction mechanism for the following reaction:

N2O5 + NO 🡪 3NO2

The rate law for this equation is r=k[N2O5]1 and the reaction takes place in two steps. (Indicate which step is the slow step)

Step 1: N2O5 🡪 NO2 + NO3 (Slow)

Step 2: NO3 + NO 🡪 NO2 + NO2 (Fast)

N2O5 + NO 🡪 3NO2

1. Propose a possible reaction mechanism for the following reaction:

Cl2 + CHCl3 🡪 HCl + CCl4

The rate law for this equation is r=k[Cl2]1 and the reaction takes place in three steps. (Indicate which step is the slow step)

Step 1: Cl2 🡪 Cl + Cl (Slow)

Step 2: Cl + CHCl3 🡪 HCl + CCl3 (Fast)

Step 3: CCl3 + Cl 🡪 CCl4 (Fast)

Cl2 + CHCl3 🡪 HCl + CCl4

1. a) Propose a possible reaction mechanism for the following reaction:

Br2 + 2NO 🡪 2BrNO

The rate law for this equation is r=k[Br2]1[NO]1  (indicate which step is the slow step)

Step 1: Br2 + NO 🡪 Br2NO (Slow)

Step 2: Br2NO + NO 🡪 2BrNO (Fast)

b) Draw the potential energy diagram for this reaction